WHAT IS CLAIMED IS:

1. An organic photovoltaic conversion device comprising:
a matrix material;
carbon nanotubes dispersed in the matrix material; and
photovoltaic organic molecules attached to defect sites on the carbon nanotubes.

2. The device of claim 1, wherein the photovoltaic organic molecules are adapted to generate a photocurrent upon absorbing radiation.

3. The device of claims 1 or 2, wherein the photovoltaic organic molecules are chemisorbed to the defect sites on the carbon nanotubes such that the absorbed radiation provides excitation transfer from the photovoltaic organic molecules to the carbon nanotubes.

4. The device of claim 1, 2 or 3, wherein the photovoltaic organic molecules comprise organic dye molecules.

5. The device of claims 1, 2, 3 or 4, wherein the device comprises a solar cell.

6. The device of claims 1, 2, 3 or 4, wherein the device comprises a photodetector.

7. The device of claims 1, 2, 3, 4, 5 or 6, wherein the defect sites on the carbon nanotubes comprise a carboxyl group or a C_{1-6} alkyl group.

8. The device of claim 7, wherein the C_{1-6} alkyl group comprises a sec-butyl group.

9. The device of claims 1, 2, 3, 4, 5, 6, 7 or 8, wherein:

the matrix material comprises a polymer matrix material; and
the carbon nanotubes are well dispersed in the polymer matrix material.

10. The device of claim 9, wherein the polymer matrix material is selected from a group consisting of polyamide, polyester, polyurethane, polysulfonamide, polycarbonate, polyurea, polyphosphonoamide, polyarylate, polyimide, poly(amic ester), poly(ester amide), a poly(enaryloxynitrile) matrix or mixtures thereof.

11. The device of claims 4 or 5, wherein the organic dye comprises a phenazine dye.

12. The device of claim 11, wherein the dye comprises PSF.

13. The device of claim 5, wherein the organic dye is selected from a group consisting of one or more of azo dyes, phthalocyanine dyes, quinine dyes, quinoline dyes, porphyryne dyes, pyrylium dyes and perylyne dyes.

14. The device of claim 5, further comprising at least one of a p and n type charge transporting layers located in contact with the matrix material.

15. The device of claim 14, wherein the charge transporting layers are selected from a group consisting of hydrazone compounds, benzidine compounds and styryl compounds.

16. The device of claims 1-14 further comprising different types of photovoltaic organic molecules attached to the carbon nanotubes, wherein the different types of molecules have a peak sensitivity to different radiation wavelengths.

17. The device of claims 5, 6 or 14, further comprising two electrodes.

18. The device of claim 16, wherein at least one electrode is transparent to radiation.

19. The device of claim 5, wherein the solar cell comprises a Schottky type cell comprising a single charge generating layer comprising the matrix material layer containing one type of organic photovoltaic molecule.

20. The device of claim 5, wherein the solar cell comprises a bilayer cell containing a heterojunction of two charge generating layers each containing a different type of organic photovoltaic molecule.

21. The device of claims 1 to 21, wherein:

the matrix material comprises a flexible thin film or a flexible threat that is formed on a substrate; and

an overall stiffness of the device is determined by a stiffness of the substrate.

22. The device of claims 1 to 21, wherein the carbon nanotubes are aligned in a controlled manner in the matrix material.

23. The device of claims 1 to 21, wherein the matrix material is formed on an outer surface of a space suit or a space ship.

24. A method of making an organic photovoltaic conversion device comprising:

forming defect sites on carbon nanotubes;

attaching photovoltaic organic molecules to the defect sites on the carbon nanotubes; and

incorporating the nanotubes and the photovoltaic organic molecules into a matrix material.

25. The method of claim 24, wherein:

the photovoltaic organic molecules are adapted to generate a photocurrent upon absorbing radiation;

the photovoltaic organic molecules are chemisorbed to the defect sites on the carbon nanotubes such that the absorbed radiation allows excitation transfer from the photovoltaic organic molecules to the carbon nanotubes; and

the photovoltaic organic molecules comprise organic dye molecules.

26. The method of claim 24 or 25, wherein:

the step of forming defect sites comprises reacting the carbon nanotubes with an anionic initiatior thereby generating anions on the surface of the carbon nanotubes;

the step of attaching photovoltaic organic molecules comprises covalently bonding the photovoltaic organic molecules to the anions.

27. The method of claim 26, wherein the anionic initiator comprises an alkyllithium salt.

28. The method of claim 27, wherein the alkyllithium salt is *sec*-butyllithium which forms sec-butyl groups on the carbon nanotubes.

29. The method of claim 24 or 25, wherein:

the step of forming defect sites comprises reacting the carbon nanotubes with an acid thereby generating carboxyl groups on the surface of the carbon nanotubes;

the step of attaching photovoltaic organic molecules comprises covalently bonding the photovoltaic organic molecules to the carboxyl groups.

30. The method of claim 29, wherein the acid comprises a mixture of sulfuric and nitric acids.

31. The method of any one of claims 24 to 30 wherein the step of incorporating the nanotubes and the photovoltaic organic molecules into a matrix material

comprises incorporating the nanotubes and the photovoltaic organic molecules into a polymer matrix material.

32. The method of claim 31, wherein the polymer matrix material comprises a flexible polymer thin film or a flexible polymer thread.

33. The method of claim 32, wherein the step of incorporating the nanotubes and the photovoltaic organic molecules into the polymer matrix material comprises incorporating carbon nanotubes and the attached photovoltaic organic molecules into the polymer matrix material by interfacial polymerization.

34. The method of any of claims 24 to 33, wherein the device comprises a solar cell.

35. The method of any of claims 24 to 33, wherein the device comprises a photodetector.

36. The method of claim 31, wherein the polymer matrix material is selected from a group consisting of polyamide, polyester, polyurethane, polysulfonamide, polycarbonate, polyurea, polyphosphonoamide, polyarylate, polyimide, poly(amic ester), poly(ester amide), a poly(enaryloxynitrile) matrix or mixtures thereof.

37. The method of claim 25, wherein the organic dye comprises a phenazine dye.

38. The method of claim 25, wherein the organic dye is selected from a group consisting of one or more of azo dyes, phthalocyanine dyes, quinine dyes, quinoline dyes, porphyryne dyes, pyrylium dyes and perylyne dyes.

39. The method of claim 34, further comprising forming at least one of a p and n type charge transporting layers in contact with the matrix material.

40. The method of claims 34 or 35, further comprising forming two electrodes in contact with organic layers of the solar cell.

41. A method of generating electricity from solar radiation comprising exposing the solar cell of claim 5 to solar radiation such that excitation transfer from the photovoltaic organic molecules to the carbon nanotubes results from the absorbed solar radiation.

42. The method of claim 42, further comprising collecting a photoelectric current generated by the excitation transfer at electrodes contacting the solar cell.